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Your Ref.: 12841  
Our Ref.: MUH-12841

January 9, 2007

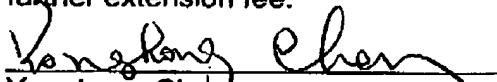
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Re: Anton Mauder et al. - U.S. Patent Application  
Application No.: 10/686,849 - Filed: October 16, 2003

Dear Mr. Kottmann:

We enclose herewith an Advisory action dated January 5, 2007. The Examiner has stated in the Advisory action that the request for reconsideration has been considered but does not place the application in condition for allowance because the arguments are not persuasive.

You may file a Notice of Appeal if you disagree with the Examiner's reasoning or you may file an RCE if you would like to further amend claims. Please review the Examiner's rejection on pages 2-4 and especially the Examiner's "Response to Arguments" on pages 4-5 of the advisory action, and let us know how do you want to proceed before January 11, 2007 in order to avoid further extension fee.

  
Yonghong Chen

Encl.: Advisory action

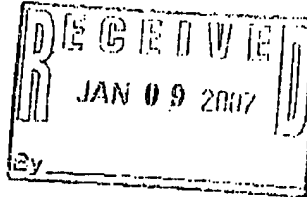


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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/686,849	10/16/2003	Anton Mauder	MUH-12841	1748

24131 7390 01/05/2007  
LERNER GREENBERG STEMER LLP  
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EXAMINER

PHAM, LONG

ART UNIT PAPER NUMBER

2814

MAIL DATE DELIVERY MODE

01/05/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

Attorney: YHC

Date Advisory Mailed: 1/5/07

RCE/Appeal Due Date: 1/11/07

To Birgit on: \_\_\_\_\_

JAN 09 2007

<b>Advisory Action</b> <b>Before the Filing of an Appeal Brief</b>	<b>Application No.</b> 10/686,849	<b>Applicant(s)</b> MAUDER ET AL.	
	<b>Examiner</b> Long Pham	<b>Art Unit</b> 2814	

**--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

THE REPLY FILED 21 November 2006 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

1. ☒ The reply was filed after a final rejection, but prior to or on the same day as filing a Notice of Appeal. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114. The reply must be filed within one of the following time periods:

a) ☒ The period for reply expires 3 months from the mailing date of the final rejection.

b) ☐ The period for reply expires on: (1) the mailing date of this Advisory Action, or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.

Examiner Note: If box 1 is checked, check either box (a) or (b). ONLY CHECK BOX (b) WHEN THE FIRST REPLY WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**NOTICE OF APPEAL**

2. ☐ The Notice of Appeal was filed on \_\_\_\_\_. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

**AMENDMENTS**

3. ☐ The proposed amendment(s) filed after a final rejection, but prior to the date of filing a brief, will not be entered because

(a) ☐ They raise new issues that would require further consideration and/or search (see NOTE below);

(b) ☐ They raise the issue of new matter (see NOTE below);

(c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or

(d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.

NOTE: \_\_\_\_\_ (See 37 CFR 1.116 and 41.33(a)).

4. ☐ The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).

5. ☐ Applicant's reply has overcome the following rejection(s): \_\_\_\_\_.

6. ☐ Newly proposed or amended claim(s) \_\_\_\_\_ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).

7. ☐ For purposes of appeal, the proposed amendment(s): a) ☐ will not be entered, or b) ☐ will be entered and an explanation of how the new or amended claims would be rejected is provided below or appended.

The status of the claim(s) is (or will be) as follows:

Claim(s) allowed: \_\_\_\_\_.

Claim(s) objected to: \_\_\_\_\_.

Claim(s) rejected: \_\_\_\_\_.

Claim(s) withdrawn from consideration: \_\_\_\_\_.

**AFFIDAVIT OR OTHER EVIDENCE**

8. ☐ The affidavit or other evidence filed after a final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).

9. ☐ The affidavit or other evidence filed after the date of filing a Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing of good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).

10. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

**REQUEST FOR RECONSIDERATION/OTHER**

11. ☒ The request for reconsideration has been considered but does NOT place the application in condition for allowance because:  
See attached office action.

12. ☐ Note the attached Information Disclosure Statement(s). (PTO/SB/08) Paper No(s). \_\_\_\_\_

13. ☐ Other: \_\_\_\_\_.

Long Pham  
 Primary Examiner  
 Art Unit: 2814

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**Advisory Action**

**Status of Amendment after final**

The response dated 11/21/06 has been entered and considered.

**Status of pending claims**

***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1, 5, 8-11, and 15-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al. (US pat 6,440,828) in combination with Cheng et al. (US pat 5,873,984) and Slater, Jr. et al. (US publication 2004/0171204).

With respect to claim 1, Sato et al. teach a contact configuration, comprising (see the abstract and claims 1-8):

a semiconductor body of monocrystalline silicon;

a refractory metal layer; and

a layer of amorphous silicon disposed between the semiconductor body and the refractory metal, for forming an ohmic contact between the refractory metal layer and the semiconductor body.

Sato et al. appear to fail to teach doping the amorphous silicon with hydrogen.

Cheng et al. teach doping amorphous silicon with hydrogen to improve mechanical property. See col. 2, lines 25-30.

It would have been obvious to one of ordinary skill in the art of making semiconductor devices to dope the amorphous silicon of Sato et al. with hydrogen to obtain the above advantage.

With respect to claims 5 and 8, Sato et al. further teach the semiconductor body is a n or p type conductive region. See col. 7, lines 1-10.

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With respect to claim 1, the use of aluminum, chromium, or aluminum/chromium in forming ohmic contact is well-known.

With respect to claim 1, the incorporation of trench component comprising of diode, bipolar transistor, MOSFET, and IGBT is well-known.

With respect to claims 9 and 10, Sato et al. fail to teach the range for the thickness of the amorphous silicon layer.

However, it would have been obvious to one of ordinary skill in the art of making semiconductor devices to determine the workable or optimal range for the thickness of the amorphous silicon layer through routine experimentation and optimization to obtain optimal or desired device performance because the thickness of the amorphous silicon layer is a result-effective variable and there is no evidence indicating that it is critical or produces any unexpected results and it has been held that it is not inventive to discover the optimum or workable ranges of a result-effective variable within given prior art conditions by routine experimentation. See MPEP 2144.05.

With respect to claim 11, Sato et al. fail to teach the range for the concentration of the amorphous silicon layer.

However, it would have been obvious to one of ordinary skill in the art of making semiconductor devices to determine the workable or optimal range for the concentration of the amorphous silicon layer through routine experimentation and optimization to obtain optimal or desired device performance because the concentration of the amorphous silicon layer is a result-effective variable and there is no evidence indicating that it is critical or produces any unexpected results and it has been held that it is not inventive to discover the optimum or workable ranges of a result-effective variable within given prior art conditions by routine experimentation. See MPEP 2144.05.

With respect 15, Sato et al. further teach a field stop zone in the semiconductor body adjoining the layer of amorphous silicon. See the

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abstract.

With respect to claims 16, 17, and 18, the incorporation of an emitter which has the same or opposite conductivity type as the semiconductor body for forming IGBT is well-known. Further, the formation of an ohmic contact in the area of an emitter of IGBT is well-known.

With respect to claim 19, it is submitted that if an emitter is incorporated into the semiconductor body of Sato et al. the emitter would inherently form a schottky or ohmic contact with high contact resistance in the absence of the amorphous silicon layer.

With respect to claim 20, the formation of ohmic contact in rear or front of a semiconductor body is well-known.

With respect to claim 21, it is submitted that since Sato et al. teach an ohmic contact having an amorphous silicon layer, the injection of charge carriers would inherently attenuate.

With respect to claim 22, the crystallization of amorphous silicon is well-known.

With respect to claim 23, Sato et al. fail to teach that the layer formed between the metal layer and semiconductor is made of silicon carbide.

Slater, jr et al. teach forming a silicon carbide between a silicon carbide substrate and a metal layer to obtain an ohmic contact which is economic to make. See claim 1 and [0016].

It would have been obvious to one of ordinary skill in the art of making semiconductor devices to replace amorphous silicon with silicon carbide to achieve the above advantage.

#### ***Response to Arguments***

Applicant's arguments filed 11/21/06 have been fully considered but they are not persuasive. See below.

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In response to the applicant's arguments in paragraphs on pages 3 and 4 of the response dated 11/21/06, it is submitted that the prior art motivation or advantage may be different than that of applicants while still supporting a conclusion of obviousness. In *Re Wiseman* 201 USPQ 658 (CCPA); *Ex Parte Obiaya* 227 USPQ 58 (Bd. of App. 1985). Further it is submitted that the fact that the applicants have a different reason or advantage resulting from doing what the relied prior art suggested doing is not indicative or demonstrative of unobviousness. In *Re Kronig* 190 USPQ 425,428 (CCPA 1976); In *Re Lintner* 173 USPQ 560 (CCPA 1972).

In response to the applicant's arguments in paragraphs on page 5 of the response dated 11/21/06, it is submitted that the rejoinder of method claims 24-29 and 32-37 will be considered upon the indication of allowability of device claims 1, 5, 8-11, and 15-23.

#### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Long Pham whose telephone number is 571-272-1714. The examiner can normally be reached on Mon-Frid, 10am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on 571-272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Long Pham  
Primary Examiner  
Art Unit 2814

LP